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By substituting the values of x found above in the original equation, we see that 0 and $\pm\infty$ are to be rejected. We find, however, by inspection that $x = 1$ is a root.

Hence, the roots are 1 and $(1 \pm \sqrt{5})/2$.

Also solved by ALBERT N. NAUER, A. M. HARDING, C. E. GITHENS, V. M. SPUNAR, ELIJAH SWIFT, W. C. EELLS, G. W. HARTWELL, and the PROPOSER.

430A. Proposed by H. C. FEEMSTER, York College, Neb.

Solve the equations

$$\sum_{i=1}^{n} x_i - x_n = k + \frac{n^2 - 3n + 2}{2} d, \qquad (1)$$

$$\sum_{i=1}^{n} x_i - x_{n-1} = k + \frac{n^2 - 3n + 4}{2} d, \qquad (2)$$

$$\sum_{i=1}^{n} x_i - x_{n-2} = k + \frac{n^2 - 3n + 6}{2} d, \qquad (3)$$

$$\cdot \quad \cdot \quad \cdot \quad \cdot \quad \cdot \quad \cdot \quad \cdot \quad \cdot \quad \cdot \qquad \vdots$$

$$\sum_{i=1}^{n} x_i - x_1 = k + \frac{n^2 - n}{2} d. \qquad (n)$$

SOLUTION BY A. M. HARDING, Univ. of Arkansas.

Add the given equations and obtain

$$(n-1) \sum_{i=1}^{n} x_i = nk + \frac{n^3 - 3n^2 + n^2 + n}{2} d,$$

or

$$\sum_{i=1}^{n} x_i = \frac{n}{n-1} \cdot k + \frac{n(n-1)}{2} d.$$

Subtract each of the given equations from this equation and obtain

$$x_n = \frac{k}{n-1} + (n-1)d,$$

$$x_{n-1} = \frac{k}{n-1} + (n-2)d,$$

$$x_{n-2} = \frac{k}{n-1} + (n-3)d,$$

$$\cdot \quad \cdot \quad \cdot \quad \cdot \quad \cdot \quad \cdot \quad \cdot$$

$$x_2 = \frac{k}{n-1} + d,$$

$$x_1 = \frac{k}{n-1}.$$

Also solved by NATHAN ALTSHILLER, S. A. JOFFE, J. W. CLAWSON, FRANK R. MORRIS, ELBERT H. CLARKE, HORACE OLSON, N. P. PANDYA, and the PROPOSER.

431. Proposed by ELMER SCHUYLER, Brooklyn, N. Y.

Form a magic square of 9 cells such that (the integers being all different) the products of the integers in the rows, columns, and diagonals shall be the same and the smallest product possible.